REMARKS

Reconsideration of this Patent Application is respectfully requested in view of the foregoing amendments, and the following remarks.

It is noted that the previously made Restriction Requirement has been repeated and made final. Thus, nonelected Claims 9 and 10 have been withdrawn from further consideration by the Patent Examiner.

The amendments to this Patent Application are as follows. The original Abstract of the Disclosure has been cancelled and has been replaced by a rewritten Abstract that is limited to a single paragraph on a separate sheet and does not exceed 150 words in length. Withdrawal of this objection to the Abstract is respectfully requested.

Claim 7 has been amended to be rewritten in independent claim format. Thus, Claim 7 should now be found to be allowable, based upon page 4 of this Office Action.

The Applicants comment upon the prior art rejection of the claims as follows.

The Patent Examiner rejects claims 1 to 6 and 8 under 35 U.S.C. 102 as being anticipated in view of *Kim et al (U.S. Patent No. 5,382,412)*. *Kim* is discussed in the present application. The disadvantages of *Kim* are discussed on page 3,

last paragraph of the present application to page 5, end of paragraph 2. It is an object of the present invention to avoid the disadvantages of *Kim*.

This object is achieved by the claimed apparatus. The claimed apparatus differs from *Kim's* apparatus in the kind of heating device (23). *Kim* uses a microwave heating means (see e.g. column 16, lines 34 to 35), whereas the present invention claims a thermal heating device (14). Hence, the statement of the Patent Examiner on page 3, third line from the bottom of the Office Action is respectfully submitted to be in error. *Kim et al.* does not disclose a heater device wherein the heating means is a radiation source for thermal radiation. *Kim et al.* discloses a heater device wherein the heating means is a radiation source for microwave radiation! Microwave radiation (wave length 1m to 1mm) is clearly different from thermal radiation. The present application defines the preferred wave length as follows, wherein the preferred wave length is 0.4 to 300 μm; and especially preferred is 0.7 to 25 μm for the wave length.

The use of thermal radiation according to the present invention instead of microwave radiation as taught by *Kim* is so different that there can be no anticipated under U.S.C. 102. Because *Kim's* intention was to improve the use of microwave irradiation for heating fluidized bed reactors, (See column 1,

lines 10, 11 of *Kim*), the claimed use of another or thermal radiation is nonobvious in view of microwave heating based upon *Kim*.

More particularly, the *Kim U.S. Patent No. 5,382,412*, in column 7 in lines 38 to 47, discloses that microwave generator 23 converts electrical power to microwaves 25. Usually microwaves of 915 or 2450 MHz are generated, in the mode of either pulse waves or continuous waves, by commercially available microwave generators. The generated microwaves 25 travel through the waveguide 24, which is connected to the applicator 2, and then penetrate through the quartz wall at the side of heating zone 10. Waveguide 24 is normally made of a metal such as aluminum or brass for an efficient traveling of microwaves.

The claimed thermal heating is entirely different from the microwave heating of the prior art. This is shown by the present Specification on pages 17, 18, 19 and 20. Comparative Examples 1 and 2 are based upon microwave heating and are shown on pages 17 and 18, while Invention Examples are based upon thermal radiation heating and are shown on pages 19 and 20.

In <u>Comparative Example 1</u>, the microwave heating was tested.

The fluidized bed was operated at approximately 1.5 times the fluidization velocity u_{mf}.

After operation for 24 hours under the above conditions, the silicon particles were removed from the fluidized bed and the grain size distribution was analyzed. Sintering processes and the formation of agglomerates meant that the mean grain size had risen to 720 µm. The size of the agglomerates was up to 4 mm. Moreover, there were numerous particles caked onto the inner side of the inner reactor tube.

In Comparative Example 2, microwave heating was tested.

This time, the fluidized bed was operated at approximately 2.5 times the fluidization velocity u_{mf}.

After operation for 24 hours under the above conditions, the silicon particles were again removed from the fluidized bed and the grain size distribution was analyzed. Sintering processes and the formation of agglomerates meant that the mean grain size had once again risen. This time, the mean grain diameter was 610 µm. This time, the inner side of the quartz tube exhibited considerably fewer caked-on particles.

In Invention Example 1, the reactor was rebuilt for the following tests. Instead of the microwave heating, a radiant heater was fitted as the source of thermal radiation. This heater was a tube with meandering slits made from graphite with a SiC surface coating, which surrounded the inner reactor tube in the region of the heating zone without coming into contact with the

latter. The radiant heater was supplied with electric power via a controllable voltage source. Its maximum output was 40 kW.

As in Comparative Example 1, the fluidized bed was operated for 24 hours at approximately 1.5 times the fluidization velocity u_{mf}. The grain size analysis of the particles which were then removed revealed a mean grain diameter of 565 µm. No sintered-together agglomerates were found. The inner side of the reactor tube was completely free of deposits for Invention Example 1.

In Invention Example 2, it was demonstrated that the process is suitable for the production of high-purity silicon. For this purpose, the arrangement with the radiant heater was used once again.

The reactor was operated for 7 days at this setting. Product was removed every half hour, resulting in a mean production rate of 1.27 kg/h. The mean diameter of the product was 780 µm, and the product was free of agglomerates. After the end of the test, the inner side of the reactor tube in the region of the heating zone was completely free of wall deposition and caked-on product, for Invention Example 2.

For all these reasons, this one prior art reference to *Kim* fails to provide an identical disclosure of the claimed invention. Hence, the present invention is not anticipated under

35 U.S.C. 102. Withdrawal of this ground of rejection is respectfully requested.

The present Specification on pages 17, 18, 19 and 20 was discussed above as it relates to the comparative testing between the claimed thermal radiation heater device, and the prior art (such as *Kim*) microwave heater device. The claimed invention provided new and unexpected results wherein there were no sintered-together agglomerates and the inner side of the reactor tube was completely free of deposits. In the comparative examples, the microwave device produced agglomerates which are undesirable, and caused numerous particles to be caked onto the inner side of the inner reactor tube, which is also undesirable.

In summary, claim 7 has been amended, and claims 1 to 10 are pending. In view of the above, it is firmly believed that the present invention, and all the claims, are patentable under 35 U.S.C. 103 over the prior art applied by the Patent Examiner.

A prompt notification of allowability is respectfully

requested.

Respectfully submitted,
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I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on October 29, 2004.

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